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ABSTRACT

The problem of response set is important for questionnaire designers and interpreters, but the public is affected as well if policy is determined on the basis of unsupported conclusions. This study focused on one of the most researched response sets, extreme responding (ER), or extreme checking styles, and its relationship to one dimension of thinking style, the concreteness-abstractness dimension. Undergraduate and graduate college students (n=320) who had demonstrated 4 single-dominance styles in an earlier study completed the Gregorc Style Delineator (A. Gregorc, 1984) and 12 brief attitude questionnaires covering 2 controversial and 2 noncontroversial topics. The concreteness-abstractness dimension in thinking style, initially hypothesized to be a strong contributor to the use of ER response set was found in this study to be unimportant. Item format and item content emerged as very important. Apparently, respondents are sensitive to the type of question format used and the controversy level of the topics. Questionnaire designers seeking to minimize the influence of response set could include a variety of formats in a questionnaire, in short sections, so that the chance of having a medium of expression that fits the styles of individual respondents is increased. (Contains 6 tables, 1 figure, and 26 references.) (SLD)

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# EXTREME RESPONDING STYLE AND THE CONCRETENESS-ABSTRACTNESS DIMENSION

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## Introduction

The identification of threats to measurement reliability and validity in survey instruments has been a concern for designers and interpreters of these instruments for decades. Researchers have investigated both personal and measurement characteristics in an effort to pinpoint variables responsible for the threat which has been called response set (Alwin & Krosnick, 1991; Bachman & O'Malley, 1984; Cronbach, 1946, 1950; Edwards, 1953; Hamilton, 1968; Hui & Triandis, 1985, 1989; Rorer, 1965; Swearingen, 1997). Some of the variables that have been investigated are: thinking style, item format, content of items, degree of certainty, ethnicity, gender, length of questionnaire, use of a midpoint, and number of response categories.

Response set has been defined in diverse ways. Hamilton (1968) portrays it as a consistent, uniquely personal characteristic. Hui and Triandis (1985) define it as "the tendency to respond in a manner that is unrelated to the content of the instrument" (p. 253). Cronbach (1946, 1950) also regarded it as independent of content, and found it most problematic with instruments which measured ability, personality, attitude, or interest. Edwards (1953) believed that response set involved a conscious deliberation to present an impression, and Rorer (1965) believed that personal motivation in responding to the instrument was a significant factor. In another study, familiarity with the topic being surveyed was found to increase the potential for random guessing (Tittle & Hill, 1967). Though response set is commonly felt to be a personal characteristic that is present apart from item content, Swearingen (1997) found it to be associated with controversy of content in a study examining several possible correlates of response set. In that study, both extreme responding checking style and response range tended to be most highly associated with controversy of content.

It also is believed that certain measurement characteristics can increase its occurrence. Long questionnaires with all items in the same format can bore and tire the respondent and encourage random guessing or extreme responses. Instructions which are unclear may produce an erratic pattern of responses which increase ambiguity and confusion in the outcomes. Some item formats, such as the true-false or rating scale formats have been found to be especially susceptible to response set problems (Cronbach, 1946).

The problem of response set is most immediate for questionnaire designers and interpreters, who may arrive at the wrong conclusions based on poorly designed instruments. However, the public is affected on several levels as well. In business, politics, and education, policy sometimes is determined on the basis of surveys or evaluations. If the presence of response set has resulted in unsupportable conclusions being drawn from these instruments, production and profits may suffer. Educational policy decisions may be misdirected, and even government programs of action may quickly lose support. It is important, then, to seek possible correlates of response set

so that guidelines in questionnaire design and/or administration can be set for decreasing its incidence.

Several models exist which provide criteria for identifying specific kinds of response set. One model, developed by Hui and Triandis (1985) includes three categories of response set: 1) acquiescence/directional bias, 2) response range, and 3) extreme responding style. According to this model, acquiescence/directional bias (A/D) is the tendency to agree, say yes, or use either end of a scale. Response range (RR) refers to the width of categories chosen by the respondent over the entire scale. Extreme checking style (ER) is the tendency to use only the ends of the scale for responses.

This study focused on one of the most researched response sets, extreme responding, or extreme checking style (ER) and its relationship to one dimension of thinking style, the concreteness-abstractness dimension. Questions that were considered were: 1) Are there differences in the use of ER between concrete thinkers and abstract thinkers? 2) Is degree of certainty, as measured by "How certain are you of your feelings about. . .?", related to ER? and 3) Are there differences in the use of ER based on content of items? on format of items?

Several factors have been linked with incidence of ER. ER was found by Bachman and O'Malley (1984) to be associated with ethnicity; in particular, it was more prevalent in African-Americans than in Anglo-Americans. Hui and Triandis (1989) further investigated its relationship to ethnicity and concluded it was more common as well among Hispanic-Americans than among Anglo-Americans. They cite differences in psychological phenomena of a culture as a possible factor (e.g., what the culture values). Hovland and Sherif (1952, cited in Dawes, 1972) concluded that ER was more likely to be seen with disagree statements than with agree statements. Swearingen (1997), in a study investigating several factors potentially affecting response set, found ER to be associated with controversy of item content, degree of certainty of opinion, item format, and to a smaller extent with gender.

Thinking style effects on response set were examined in Swearingen's study, as well, in which the Gregorc Style Delineator (1984) was used to determine thinking style. Included on this instrument is the dimension of concreteness-abstractness. An insignificant main effect was found. However, an earlier study by White and Harvey (1965) found concrete thinkers more likely to respond in the extreme than abstract thinkers. White and Harvey defined concreteness partly in terms of a greater tendency to make extreme or highly evaluative judgments, as well as a tendency to form concepts quickly, and having a deficiency of means to an end. For them, abstractness was defined simply as having the opposite attributes to concreteness. Gregorc (1984) named as one characteristic of the concrete-sequential person the tendency toward a black-white perspective, with little tolerance for the shades of grey between the two

extremes. Its opposite, the abstract-sequential thinker, takes in information in large sets, and explores ideas rationally and intellectually.

While Swearingen's study (1997) failed to find significance for the effect of thinking style on response set, it included both single-dominance thinking styles and multiple-dominance, or combination, thinking styles. By separating out only the concreteness-abstractness dimension, and using only single-dominance styles, different results were hypothesized for the present study, prompted by White and Harvey's findings (1965) on concrete thinkers and the use of ER.

The Gregorc Style Delineator (1984) was designed to identify the mental-processing mode typically used by an individual when taking in and responding to information. It is patterned after models by Jung (1923, cited in Fourqurean, Meisgeier, and Swank, 1990) and Kolb (1976), both of whom employed a quaternary design found as early as writings of ancient Egypt. The Gregorc instrument is based on the concept of using dualities to organize a domain into two sets of opposing traits, accommodating a more thorough exploration of properties situated on the ends of a continuum. As a teacher and school administrator, Gregorc observed the diverse kinds of activities that students seemed to prefer in learning new concepts. This led him to design an instrument to measure what he called "mind styles." Its purpose was to serve not as a diagnostic tool, but rather as a self-awareness tool to help the individual choose, on the basis of inherent style, the types of activities that would enhance his/her performance. This instrument focuses on space (concrete-abstract) and time (sequential-random) dimensions. Four thinking styles emerge, namely, concrete-sequential (CS), concrete-random (CR), abstract-sequential (AS), and abstract-random (AR). Briefly, the CS style is characterized by preference for guided learning in a step-by-step manner, a tendency toward a black-white perspective, and learning through direct experience. The AS thinker takes in information in larger sets, focusing on the overriding theory behind it, and prefers guided rational exploration of ideas. The AR thinker also prefers experiencing ideas in the gestalt and prefers learning that involves interacting with others. The CR thinker likes investigation and experimentation, and is happiest when allowed to utilize his/her creativity to produce a new use for an old idea.

Gregorc maintains that 90% of the population tend to employ one or two styles dominantly, but that some people may be flexible in adapting any of the four styles to appropriate situations, or may possess style combinations which make this easier. He believes that styles are inborn and remain fairly constant through time, though flexibility in their use is available to the individual.

## Method

### Sample

Subjects for this study came from an earlier study by Swearingen (1997) examining the role of item format, thinking style, and item controversy in the occurrence of response set (N=597). Eight thinking styles emerged from this analysis, using the Gregorc Style Delineator (1984), including four single-dominance styles (CS, AS, AR, CR) and four combination styles (CS-AS, CS-AR, CS-CR, AR-CR). To contrast the effect of the concrete and abstract dimensions of thinking on ER for the present study, only the four single-dominance styles were used (N=320). Subjects were undergraduate and graduate college students from 11 colleges and universities in Colorado. College students were targeted because they were expected to provide heterogeneity of well-established thinking styles (Brown, 1979, cited in Holaday, Turner-Henson, & Swan, 1979; Kane & Kane, 1990) and they provided convenience in sampling. The average age of the sample was 28. Of the 320 sampled, 243 were Anglo-Americans; other ethnicity categories comprised fewer than 27 in number, which made comparisons based on ethnicity impractical. Gender was more balanced, with 170 females and 148 males, though two failed to report this characteristic.

### Procedure

During class, subjects were administered a questionnaire packet that included two envelopes -- a white envelope containing the four-minute, timed Gregorc Style Delineator and a consent form, and a yellow envelope containing 12 short, untimed attitude questionnaires, designed by this researcher and covering four topics in three different item formats, plus a demographics measure. Two of the topics were controversial (a woman's right to an abortion, homosexual rights), and two were non-controversial (arts education, standardized testing). The three item formats were: 1) the semantic differential scale (SD), the rating scale (RS), and the magnitude estimation scale (ME).

The SD scale has been used as a method for assessing attitudes since the 1940s, when Stagner and Osgood (1946, cited in Snider and Osgood, 1969) used it to study social stereotypes. It consists of bipolar pairs of adjectives placed on a continuum, usually with seven scale-points in between each pair. The respondent's choice of a point on the continuum represents both direction and intensity of his/her attitude. The RS usually offers response choices ranging from some kind of an agree response to a disagree response and can have as few as 3 or as many as 10 choice-points. The ME scale in this study consisted of statements which were each followed by a 600-point scale from 0 (disagreement or no agreement) to 600 (complete agreement). The semantic differential and rating scales each had seven response categories for each item. The magnitude estimation scales, with categories numbered from zero to 600, and divided into increments of 100, were easily converted to a seven-point scale for comparison with the other two formats.

All scales comprised five items each plus a degree of certainty question (also scaled 1 to 7). Certainty, measured by the question "How certain are you of your feelings about. . .?", was considered an indicator of non-attitude (Warland & Sample, 1973) for future studies, as well as a possible correlate with ER. Attitude measures were administered in two different orders, one the reverse of the other, to control for the effects of fatigue in completing the assessment packet.

Scoring

ER scores were computed for each of the 12 attitude questionnaires, and were measured by counting the number of times a respondent used either end of an individual scale. In this study, ER scores ranged from 0 to 5 per questionnaire.

On the Gregorc Style Delineator (1984), subjects are presented with 10 columns of four descriptors. The following is representative of the descriptor groups:

- ☐ perfectionist
- ☐ research
- ☐ colorful
- ☐ risktaker

Scores are derived which represent four "channels," or thinking styles. The respondent is asked to assign a rating of 1-4 progressing from "least like me" to "most like me" for each descriptor in a group of four. Descriptor items in each group are deliberately inconsistent in grammatical form and tense, to discourage linear reasoning and encourage unconscious response to the impact of the word. Scoring for each respondent was accomplished by totaling ratings across eight horizontal rows of descriptors. The totals for these four styles indicate which styles are dominant for that individual. A score of 27-40 in a particular style indicated dominance in that style. Scores of 16-26 indicated intermediate use of a style, and a score of 10-15 was evidence of low usage of that style. In the case of two or more scores at 27 or above, if the second highest score was five or more points less than the highest score, then the highest score determined the dominant style. If, however, the two highest scores were separated by less than five points, they were considered both important, and a combination style was assumed. Occasionally, individuals score evenly, or nearly so, across all four styles (25-25-25-25). When this occurs, the individual is believed to have at his/her disposal the use of any of the four styles, as needed. Gregorc recognizes combinations of styles as well, but for the present study only the single-dominance styles were sampled.

Statistical Techniques

Descriptive statistics were run on all variables for purposes of describing the sample, and for determining the distribution of ER response set among respondents. A reliability analysis was conducted to verify the stability of the attitude questionnaires. Correlations between ER and degree of certainty provided a verification of earlier

findings by Swearingen (1997) that had indicated a significant, moderate relationship between these variables. Two repeated measures ANOVAs were performed: 1) to determine the importance of order (fatigue), and 2) to determine the effect of the concreteness-abstractness dimension on the incidence of ER. In addition, since there was diversity of both item format and item content, contrasts of these variables were considered. The between-subjects factor for the second ANOVA was concreteness-abstractness (thinking style), and the within-subjects factors were format and content. All analyses were conducted using SPSS, version 3.0 (SPSS, Inc., 1988) and SPSS, version 6.1 (SPSS, Inc., 1994a,b).

## Results

Table 1 gives the reliability estimates for the 12 attitude scales. Reliability differed dependent on item format and content. Most notable were the differences on the magnitude estimation format between controversial and non-controversial content categories. The same was found to a lesser extent on the rating scales, which also were less reliable overall than the semantic differential. Even so, it demonstrated acceptable reliability levels. The semantic differential was found most reliable, and consistently so, across all content categories. This supports the research of Marshall and Merritt (1986, cited in Emmerson & Neely, 1988) who reported several studies using SDs that had reliability estimates ranging from .90 to .93. Hui and Triandis (1985) concluded in their studies on response set that it remains stable in both controversial and non-controversial settings; however, the present study brings this into question.

The sample included 320 subjects, ranging in age from 17 to 61, with an average age of 28. Table 2 describes the distribution of thinking styles that emerged from the Gregorc instrument for this sample. CS and CR were collapsed into a group representing concrete thinkers ($\underline{n}$ = 187), and AS and AR thinkers were collapsed to form a group of abstract thinkers ($\underline{n}$ = 133).

Descriptives for the ER response set revealed variations across content and format of items (See Figure 1). The widest variation in ER scores occurred across the three formats for the content area of arts education.

Correlations among ER measures and the degree of certainty measure indicate moderate to high-moderate associations between ER and degree of certainty for all scales and content areas, except the magnitude estimation scales in non-controversial settings (see Table 3). This supports research by Hamilton (1968), Hui and Triandis (1985), and Cantril 1946), who found certainty and ER to be related. It would suggest support for research by White and Harvey (1965) who describe concreteness as characterized by highly evaluative judgments and intolerance of ambiguity. In this study, where correlations between degree of certainty and ER were negative, the more

certain respondents were about their responses on the rating scale on arts education attitudes, the less extreme were their responses. All other format and topic areas resulted in extreme responses occurring with greater certainty. It may be that this scale was less clear, or it may be that they were responding with greater care in response in a format in which they were comfortable. It also could indicate a weaker instrument.

The multivariate analysis of order as a possible indicator of fatigue revealed that there was no significant effect of order (sig.=.095). To expand this finding, effect size, measured as eta-squared, was computed at .06, considered a small effect size (Cohen, 1988). The power of this analysis was .83. In examining individual scales, univariate effect sizes for order never exceeded .01. It was decided that order was not a correlate to be considered important in this study, and its use as a covariate was unnecessary.

The second repeated measures ANOVA, testing for effects of concreteness-abstractness on ER, revealed that there were no significant differences between concrete and abstract thinkers on ER (sig.=.713; see Table 4). When thinking style interacted with the two within-subjects factors of item format (sig.=.157) and item content (sig.=.718), non-significance again was found. Analysis of the main effects of item content and item format, however, produced significance (sig. $\leq$ .001, in both cases). Effect sizes were .30 and .12, respectively. These are considered large and moderate effect sizes, respectively (Cohen, 1988). Specific contrasts of format and content were tested (see Table 5) which also revealed significance (sig. $=\leq$.001) for: 1) controversy versus non-controversy of content, 2) for contrast of the two non-controversial topics, 3) for contrast of the semantic differential with the other two formats, and 4) for the contrast between the rating scale and the magnitude estimation scale formats. Of particular importance, evidenced by moderate to large effect sizes, were the differences in ER observed between controversy and non-controversy of content (effect size=.39), between the two non-controversial content areas (effect size=.37), and between the ME and RS formats (effect size=.18).

Examination of a contingency table crossing the categories of ER (1 to 5) with the concrete and abstract dimensions (see Table 6) suggested minor differences between concrete and abstract thinkers in use of these categories on each scale. The use of categories 1, 2, and 3 was about the same for both groups; however, slightly greater proportions of concrete thinkers used category 4 and a greater proportion of abstract thinkers used category 5. Differences were apparently inconsequential, however, since proportions were very close. The ANOVA supported this conclusion.

## Discussion

The concreteness-abstractness dimension in thinking style, initially hypothesized to be a strong contributor to the use of ER response set, was found in this study to be unimportant. This corroborates earlier findings by Swearingen's study (1997), which

included more thinking styles and more response sets. It would seem to contradict the earlier findings of White and Harvey (1965), who found that concrete thinkers employed ER response set more frequently than abstract thinkers. Their study included several kinds of scales, including a scale measuring dogmatism, a scale rating beliefs, a personality scale, an opinion scale; and a favorable-unfavorable scale on the same items as the opinion scale. Further study could explore this relationship using another thinking style measure to further examine their claim. It may be that the content or format of White and Harvey's instruments was especially compatible with the concreteness attribute, or it may be that the variability in format and controversy level of the present study overshadowed any potential effect of concreteness. The contradiction between their study and this study ought to serve to stimulate further exploration to verify the results.

In this study, item format and item content emerged as very important. Apparently, respondents on questionnaires are sensitive to the type of question format that is employed and the controversy level of the items. In particular, the semantic differential format may be confusing for many, since it is not commonly employed; however, it was found to be the most reliable format for reflecting attitudes, so perhaps it should be considered more frequently as the appropriate format (see Table 1). Similarly, the magnitude estimation format is not as familiar as the rating scale format. However, while format and content were found significant, large residuals remained, so there are apparently other more important variables to be considered. Possible targets for investigation are motivation of respondents, personality, and temperament.

The problem of response set is a persistent one. It is unlikely it will be completely eliminated; however, efforts toward minimizing it should be diligent. Questionnaire designers can strive to include a variety of formats in their instruments, presented in short sections, rather than one long questionnaire all in the same format, so that boredom is reduced. Then, the chance for having a medium for expression that fits the styles of individual respondents is increased. Where controversy exists in the subject matter, care can be taken to ensure the language is not emotionally charged, the entire spectrum of attitudes toward the subject is covered, instructions are clear, and motivation is kept positive.

The inclusion of the degree of certainty variable may be an important indicator of extreme response, since it correlated consistently with ER on all scales. The more certain a respondent is of his/her response, in most cases, the more likely the response will be extreme. This may very well reflect true attitude/opinion. However, if there is extreme response and certainty is low, or if certainty is high and response is neutral, response set may be suspected. Thus, it may be helpful in identifying the presence of response set.

Future studies should be directed toward investigating the certainty variable more thoroughly, and examining its relationship to other response sets. Other person characteristics to look at are motivation of respondents, temperament, and personality. In this study, there was visual evidence in the administration of the study that a few subjects responded with little care to the surveys. Lack of interest or motivation likely played a part in biasing their responses. Though the study was voluntary, they may have felt reluctant in a classroom situation to decline participation. Finally, the use of college students as subjects produces a restricted sample, so results may not be representative of the larger general population. Measurement characteristics warranting further investigation are the use of a midpoint or neutral response, item format, and item content, particularly controversy of content. It is clear, since accuracy of information in measurement is imperative, response set is a subject that can benefit from continual scrutiny.

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Table 1

Reliability Estimates for the 12 Attitude Questionnaires (N=320)

| Scale | SD | RS | ME | Topic Mean Alpha |
|---|---|---|---|---|
| Woman's Right to an Abortion | .94 | .80 | .92 | .89 |
| Arts Education | .95 | .73 | .68 | .79 |
| Homosexual Rights | .96 | .83 | .79 | .86 |
| Standardized Testing | .93 | .71 | .60 | .75 |
| Format Mean Alpha | .95 | .77 | .75 | .82 |

Note: SD: Semantic Differential
RS: Rating Scale
ME: Magnitude Estimation Scale

Table 2

Variations in Thinking Style

| Thinking Style (N=320) | CS | AS | AR | CR | Concrete | Abstract |
|---|---|---|---|---|---|---|
| n | 110 | 35 | 98 | 77 | 187 | 133 |
| % | 34 | 11 | 31 | 24 | 58 | 42 |

Note: CS: Concrete-Sequential
AS: Abstract-Sequential
AR: Abstract-Random
CR: Concrete-Random

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Table 3

Correlations* between Degree of Certainty and Extreme Response

| Format→ / Content ↓ | SD | RS | ME |
|---|---|---|---|
| Non-Controversial | | | |
| Arts Education | .63 | -.57 | .34 |
| Standardized Testing | .41 | .43 | .32 |
| Controversial | | | |
| Woman's Right to an Abortion | .54 | .59 | .60 |
| Homosexual Rights | .64 | .60 | .69 |

Note: SD: Semantic Differential
RS: Rating Scale
ME: Magnitude Estimation

* All correlations significant at < .001 level

Table 4

Tests of the Effect of Concreteness-Abstractness, Format, and Content on Extreme Response

| Effect | SS | F | Sig. | Effect Size |
|---|---|---|---|---|
| Between-Subject Effect | | | | |
| Concreteness-Abstractness | 1.84 | .14 | .71 | <.001 |
| Within + Residual | 4323.58 | | | |
| Format Within-Subjects Effects | | | | |
| Format | 196.13 | 43.54 | <.001 | .12 |
| Concreteness-Abstractness by Format | 8.37 | 1.86 | .16 | .01 |
| Within + Residual | 1432.50 | | | |
| Content Within-Subject Effect | | | | |
| Content | 1527.72 | 133.70 | <.001 | .30 |
| Concreteness-Abstractness by Content | 5.14 | .45 | .72 | <.01 |
| Within + Residual | 3633.72 | | | |

Table 5

Test of Contrast Effects on Incidence of Extreme Response

| Effect | SS | F | Sig. | Effect Size* |
|---|---|---|---|---|
| Format Contrasts | | | | |
| SD scale vs RS & ME scales | 37.13 | 16.95 | <.001 | .05 |
| Residual | 696.76 | | | |
| RS vs ME scales | 159.00 | 68.72 | <.001 | .18 |
| Residual | 735.74 | | | |
| Content Contrasts | | | | |
| Controversy vs Non-Controversy | 933.19 | 202.19 | <.001 | .39 |
| Residual | 1467.67 | | | |
| Gay Rights vs Abortion Rights | 4.90 | 1.35 | .25 | <.01 |
| Residual | 1153.61 | | | |
| Arts Education vs Standardized Testing | 589.63 | 185.20 | <.001 | .37 |
| Residual | 1012.44 | | | |

Note: SD: Semantic Differential
RS: Rating Scale
ME: Magnitude Estimation Scale

* Expressed as eta-squared

Table 6

Distribution of Concrete and Abstract Thinkers Who Employed Extreme Responding Checking Style

| Number of ER Responses→ / Thinking Style ↓ | 1 | 2 | 3 | 4 | 5 | Row Total |
|---|---|---|---|---|---|---|
| Concrete Thinkers | 8 | 10 | 12 | 30 | 125 | 185 |
| Abstract Thinkers | 8 | 8 | 10 | 11 | 94 | 131 |
| Column Total | 16 | 18 | 22 | 41 | 219 | 316 |

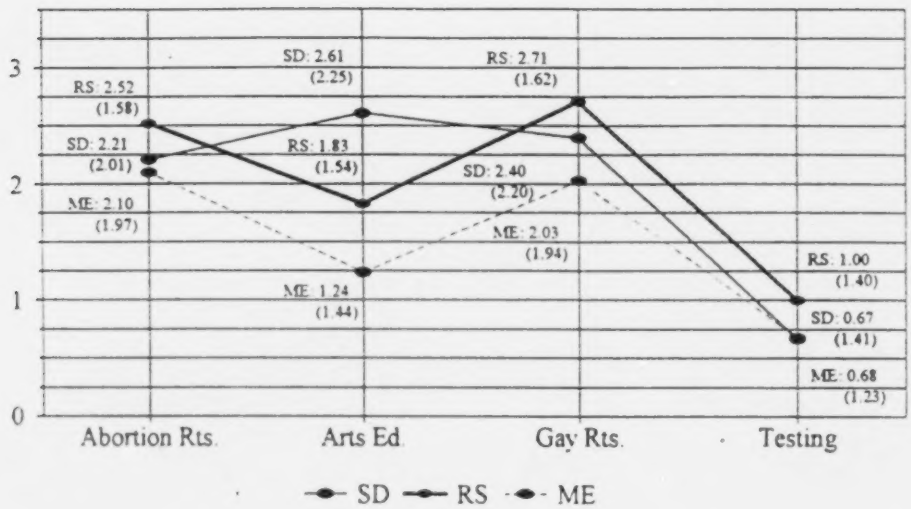


Figure 1. Extreme Responding Style Means and Standard Deviations( )

for the 12 Attitude Scales